

**Amendments to the Claims:**

Claims 1, 5, 7-19, 38 and 43 have been amended herein. Please note that all claims currently pending and under consideration in the referenced application are shown below. Please enter these claims as amended. This listing of claims will replace all prior versions and listings of claims in the application.

**Listing of Claims:**

1. (Currently amended) A method of reactivating a catalyst, comprising:  
providing a catalyst at least partially deactivated by at least one fouling agent;  
contacting the catalyst with a fluid reactivating agent at or above a critical point thereof,  
the fluid reactivating agent comprising a source of a hydride ion-at or above a critical point of the  
fluid reactivating agent;  
transferring the hydride ion from the fluid reactivating agent to the at least one fouling agent; and  
releasing the at least one fouling agent from the catalyst.
2. (Previously presented) The method of claim 1, wherein providing a catalyst at least partially deactivated by at least one fouling agent comprises providing the catalyst that catalyzes an alkylation reaction, a transesterification reaction, an esterification reaction, an oligomerization reaction, a polymerization reaction, or an isomerization reaction.
3. (Previously presented) The method of claim 1, wherein providing a catalyst at least partially deactivated by at least one fouling agent comprises providing the catalyst including an acid functionality or a base functionality.
4. (Previously presented) The method of claim 1, wherein providing a catalyst at least partially deactivated by at least one fouling agent comprises providing the catalyst at least partially deactivated by at least one hydrogen deficient fouling agent.
5. (Currently amended) The method of claim 1, wherein contacting the catalyst with

a fluid reactivating agent at or above a critical point thereof comprising a source of a hydride ion at or above a critical point of the fluid reactivating agent comprises contacting the catalyst with the fluid reactivating agent comprising a solvent reactive with the at least one fouling agent to facilitate removal, in total or in part, of the at least one fouling agent from a surface of the catalyst.

6. (Previously presented) The method of claim 1, wherein providing a catalyst at least partially deactivated by at least one fouling agent comprises providing a solid catalyst or a liquid catalyst at least partially deactivated by at least one fouling agent.

7. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent at or above a critical point thereof comprising a source of a hydride ion at or above a critical point of the fluid reactivating agent comprises contacting the catalyst with the fluid reactivating agent comprising an alkane having at least one tertiary carbon atom or a compound that can be isomerized in the presence of the catalyst to form at least one tertiary carbon atom.

8. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent at or above a critical point thereof comprising a source of a hydride ion at or above a critical point of the fluid reactivating agent comprises contacting the catalyst with the fluid reactivating agent comprising a compound selected from the group consisting of isobutane, isopentane, and mixtures thereof.

9. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent at or above a critical point thereof comprising a source of a hydride ion at or above a critical point of the fluid reactivating agent comprises contacting the catalyst with the fluid reactivating agent comprising a compound selected from the group consisting of n-butane, n-pentane, and mixtures thereof.

10. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent at or above a critical point thereof comprising a source of a hydride ion

~~at or above a critical point of the fluid reactivating agent~~ comprises contacting the catalyst with the fluid reactivating agent comprising an aromatic compound selected from the group consisting of benzene, toluene, ethylbenzene, and mixtures thereof.

11. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent ~~at or above a critical point thereof comprising a source of a hydride ion~~ ~~at or above a critical point of the fluid reactivating agent~~ comprises contacting the catalyst with the fluid reactivating agent comprising at least one of a dissolved species of hydrogen or oxygen.

12. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent ~~at or above a critical point thereof comprising a source of a hydride ion~~ ~~at or above a critical point of the fluid reactivating agent~~ comprises contacting the catalyst with the fluid reactivating agent comprising the source of the hydride ion at pressure and temperature conditions such that the fluid reactivating agent is a critical fluid.

13. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent ~~at or above a critical point thereof comprising a source of a hydride ion~~ ~~at or above a critical point of the fluid reactivating agent~~ comprises contacting the catalyst with the fluid reactivating agent comprising the source of the hydride ion at a pressure equal to a critical pressure ("P<sub>c</sub>") and at a temperature equal to a critical temperature ("T<sub>c</sub>").

14. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent ~~at or above a critical point thereof comprising a source of a hydride ion~~ ~~at or above a critical point of the fluid reactivating agent~~ comprises contacting the catalyst with the fluid reactivating agent comprising the source of the hydride ion at pressure and temperature conditions such that the fluid reactivating agent is a supercritical fluid.

15. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent ~~at or above a critical point thereof comprising a source of a hydride ion~~ ~~at or above a critical point of the fluid reactivating agent~~ comprises contacting the catalyst with the fluid reactivating agent comprising the source of the hydride ion at a pressure greater than P<sub>c</sub>

and at a temperature greater than  $T_c$ .

16. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent at or above a critical point thereof comprising a source of a hydride ion at or above a critical point of the fluid reactivating agent comprises contacting the catalyst with the fluid reactivating agent comprising the source of the hydride ion at a pressure in the range of about 0.1  $P_c$  to about 8  $P_c$ , and a temperature in the range of about 0.9  $T_c$  to about 1.3  $T_c$ .

17. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent at or above a critical point thereof comprising a source of a hydride ion at or above a critical point of the fluid reactivating agent comprises contacting the catalyst with isobutane at a temperature in the range of about 100°C to about 300°C.

18. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent at or above a critical point thereof comprising a source of a hydride ion at or above a critical point of the fluid reactivating agent comprises contacting the catalyst with isobutane at a pressure in the range of about 200 psig to about 5000 psig.

19. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent at or above a critical point thereof comprising a source of a hydride ion at or above a critical point of the fluid reactivating agent comprises contacting the catalyst with the fluid reactivating agent of sufficient density to dissolve at least one of the at least one fouling agent and products of a reaction of the fluid reactivating agent with the at least one fouling agent.

20. (Previously presented) The method of claim 1, wherein transferring the hydride ion from the fluid reactivating agent to the at least one fouling agent comprises stabilizing the at least one fouling agent.

Claim 21 (Canceled)

22. (Previously presented) The method of claim 1, wherein releasing the at least one

fouling agent from the catalyst comprises releasing the at least one fouling agent having a molecular weight approximately equal to or greater than the molecular weight of the at least one fouling agent deposited on the catalyst.

23. (Previously presented) The method of claim 1, wherein releasing the at least one fouling agent from the catalyst comprises desorbing the at least one fouling agent from the catalyst and dissolving the at least one fouling agent in the fluid reactivating agent.

24. (Previously presented) The method of claim 45, wherein removing the at least one fouling agent from the fluid reactivating agent comprises adsorbing the at least one fouling agent to a solid material.

25. (Original) The method of claim 24, wherein adsorbing the at least one fouling agent to a solid material comprises adsorbing the at least one fouling agent to a solid material selected from the group consisting of alumina, molecular sieves, and activated carbon.

26. (Previously presented) The method of claim 45, wherein removing the at least one fouling agent from the fluid reactivating agent comprises removing the at least one fouling agent from the fluid reactivating agent in a supercritical phase, a liquid phase, or a gas phase.

27. (Previously presented) The method of claim 45, wherein removing the at least one fouling agent from the fluid reactivating agent comprises precipitating the at least one fouling agent from the fluid reactivating agent.

28. (Original) The method of claim 27, wherein precipitating the at least one fouling agent comprises altering solubility properties of the fluid reactivating agent.

29. (Previously presented) The method of claim 45, wherein removing the at least one fouling agent from the fluid reactivating agent comprises using the at least one fouling agent with a recycling catalyst.

30. (Previously presented) The method of claim 45, wherein recycling the fluid reactivating agent comprises reusing the fluid reactivating agent as at least a portion of the feed mix or as a reactivating agent.

31. (Previously presented) The method of claim 45, wherein recycling the fluid reactivating agent comprises using a first portion of the fluid reactivating agent as at least a portion of a feed mix and a second portion of the fluid reactivating agent as a reactivating agent.

Claims 32-37 (Cancelled)

38. (Currently amended) A method of reactivating a catalyst, comprising:  
directing a fluid reactivating agent comprising a hydride ion towards toward at least one catalyst at least partially deactivated by at least one fouling agent, the at least one catalyst located in at least one reactor;

contacting the at least one catalyst with the fluid reactivating agent ~~comprising the hydride ion at or above a critical point of the fluid reactivating agent~~ at or above a critical point of thereof;

transferring the hydride ion from the fluid reactivating agent to the at least one fouling agent; and

forming a contaminated fluid reactivating agent comprising the at least one fouling agent.

39. (Previously presented) The method of claim 38, wherein directing a fluid reactivating agent comprising a hydride ion towards at least one catalyst at least partially deactivated by at least one fouling agent comprises directing the fluid reactivating agent towards at least one liquid catalyst or at least one solid catalyst.

40. (Previously presented) The method of claim 38, wherein directing a fluid reactivating agent comprising the hydride ion towards at least one catalyst at least partially deactivated by at least one fouling agent comprises directing the fluid reactivating agent comprising the hydride ion using a first pumping device.

41. (Previously presented) The method of claim 46, wherein directing the contaminated fluid reactivating agent to a reactivating agent recovery comprises directing the contaminated fluid reactivating agent using a second pumping device configured and operably coupled to direct the contaminated fluid reactivating agent to the reactivating agent recovery.

42. (Previously presented) The method of claim 46, wherein recycling the fluid reactivating agent comprises recycling the fluid reactivating agent using a third pumping device configured and operably coupled to recirculate clean fluid reactivating agent from the reactivating agent recovery to the at least one reactor.

43. (Currently amended) The method of claim 38, wherein contacting the at least one catalyst with the fluid reactivating agent ~~at or above a critical point of thereof comprising the hydride ion at or above a critical point of the fluid reactivating agent~~ comprises generating pressure and temperature conditions such that the fluid reactivating agent comprising the hydride ion is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities.

44. (Previously presented) The method of claim 43, wherein generating pressure and temperature conditions such that the fluid reactivating agent comprising the hydride ion is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises using at least one of a pressure control device and a temperature control device to generate the pressure and temperature conditions.

45. (Previously presented) The method of claim 1, further comprising removing the at least one fouling agent from the fluid reactivating agent and recycling the fluid reactivating agent.

46. (Previously presented) The method of claim 38, further comprising directing the contaminated fluid reactivating agent to a reactivating agent recovery, removing the at least one fouling agent from the fluid reactivating agent, and recycling the fluid reactivating agent.